

2/10/05  
AFB

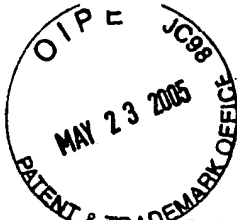
PTO/SB/21 (09-04)  
Approved for use through 07/31/2006. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>TRANSMITTAL FORM</b>  (to be used for all correspondence after initial filing)		Application Number	09/987,010
		Filing Date	November 13, 2001
		First Named Inventor	Tetsuyoshi INOUE
		Art Unit	2828
		Examiner Name	T. N. Nguyen
Total Number of Pages in This Submission	14	Attorney Docket Number	204552021700

ENCLOSURES (Check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> After Allowance Communication to TC
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Petition	<input checked="" type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Terminal Disclaimer	<input checked="" type="checkbox"/> Other Enclosure(s) (please Identify below):
<input type="checkbox"/> Express Abandonment Request	<input type="checkbox"/> Request for Refund	Return Receipt Postcard
<input type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> Landscape Table on CD	
<input type="checkbox"/> Reply to Missing Parts/Incomplete Application	Remarks	
<input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	MORRISON & FOERSTER LLP		
Signature			
Printed name	Deborah S. Gladstein		
Date	May 23, 2005	Reg. No.	43,636



PTO/SB/17 (12-04v2)  
Approved for use through 7/31/2006. OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE  
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<b>Effective on 12/08/2004.</b> <b>Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).</b>  <b>FEE TRANSMITTAL</b> <b>For FY 2005</b>		<b>Complete if Known</b>	
		Application Number	09/987,010
		Filing Date	November 13, 2001
		First Named Inventor	Tetsuyoshi INOUE
		Examiner Name	T. N. Nguyen
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27	Art Unit	2828	
<b>TOTAL AMOUNT OF PAYMENT</b>	<b>(\$)</b> 500.00	Attorney Docket No.	204552021700

**METHOD OF PAYMENT (check all that apply)**

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): \_\_\_\_\_

☒ Deposit Account Deposit Account Number: 03-1952 Deposit Account Name: Morrison & Foerster LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee

☒ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

**FEE CALCULATION****1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

**2. EXCESS CLAIM FEES**

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims      Extra Claims      Fee (\$)      Fee Paid (\$)

\_\_\_\_\_ - = \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_

Multiple Dependent Claims

Fee (\$)      Fee Paid (\$)

\_\_\_\_\_      \_\_\_\_\_

Indep. Claims      Extra Claims      Fee (\$)      Fee Paid (\$)

\_\_\_\_\_ - = \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_

**3. APPLICATION SIZE FEE**

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets      Extra Sheets      Number of each additional 50 or fraction thereof      Fee (\$)      Fee Paid (\$)

\_\_\_\_\_ - 100 = \_\_\_\_\_ /50 \_\_\_\_\_ (round up to a whole number) x \_\_\_\_\_ = \_\_\_\_\_

**4. OTHER FEE(S)**

Non-English Specification, \$130 fee (no small entity discount)

Other (e.g., late filing surcharge): 1402 Filing a brief in support of an appeal      500.00

<b>SUBMITTED BY</b>			
Signature	<u>Deborah S. Gladstein</u>	Registration No. (Attorney/Agent)	43,636
Name (Print/Type)	Deborah S. Gladstein	Telephone	(202) 778-1646
		Date	May 23, 2005



Docket No.: 204552021700  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:  
Tetsuyoshi INOUE

Application No.: 09/987,010

Confirmation No.: 6384

Filed: November 13, 2001

Art Unit: 2828

For: SEMICONDUCTOR LASER  
MANUFACTURING METHOD AND  
SEMICONDUCTOR LASER

Examiner: T. N. Nguyen

**APPEAL BRIEF**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

As required under § 41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case on March 22, 2005, and is in furtherance of said Notice of Appeal.

The fees required under § 41.20(b)(2) are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1206:

**I. REAL PARTY IN INTEREST**

The real party in interest for this appeal is Sharp Kabushiki Kaisha

05/24/2005 JADD01 00000063 031952 09987010  
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va-108076

**II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS**

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

**III. STATUS OF CLAIMS****A. Total Number of Claims in Application**

There are 6 claims pending in application.

**B. Current Status of Claims**

1. Claims canceled: none
2. Claims withdrawn from consideration but not canceled: none
3. Claims pending: 1-6
4. Claims allowed: none
5. Claims rejected: 1, 2, 5 and 6

**C. Claims On Appeal**

The claims on appeal are claims 1-6

**IV. STATUS OF AMENDMENTS**

Applicant did not file an Amendment After Final Rejection.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

The present invention relates to a manufacturing method for a semiconductor laser device assembled by using a die-bond paste. Referring to Fig. 2A, paste 2 is applied to the stem 1 (pg. 12, lines 7-8). Next, the semiconductor laser chip 3 is mounted on the stem 1 via the paste 2

(Fig. 2B and pg. 12, lines 13-15). Next, the semiconductor laser chip is temporarily cured, while pressurized toward a direction of arrow R, as shown in Fig. 2C, by a collet 10, by heating the stem 1 (pg. 12, lines 16-19). After temporarily curing the conductive die bond paste (paste 2), the semiconductor laser device (elements 1, 2 and 3) is heated in a thermostat so as to be finally cured (pg. 13, lines 1-3). As can be seen in Fig. 2D, the final curing step takes place without pressurizing by the collet 10.

Creep-up refers to when the silver paste creeps up on side faces of the semiconductor laser chip so as to reach the active layer of the semiconductor laser chip, thereby short circuiting the laser chip (pg. 5, lines 6-10). This results from heating/warming the laser chip (pg. 5, lines 10-13). It is desirable to control the creep-up to avoid short circuiting the laser chip. It is an object of the invention to control creep-up.

Further, it has been found that semiconductor laser devices with a high thermal resistance (100°C/W or higher), makes it difficult for heat generated at the active layer to transfer to the stem, causing the temperature of the active layer to increase more and more so that the semiconductor laser device fails as a result (pg. 4, lines 13-19). Accordingly, it is desirable to provide a semiconductor layer device with a lower thermal resistance as well as reduced creep-up.

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Claims 1 and 5 were rejected under 35 USC 102(e) as being unpatentable over Kotato, U.S. Patent 6,099,678.

Claims 2 and 6 were rejected under 35 USC 103(a) as being unpatentable over Kotato in view of Inaba, U.S. Patent 6,255,742.

## **VII. ARGUMENT**

**A. The rejection of claims 1 and 5 under 35 USC 102(e) as being unpatentable over Kotato, U.S. Patent 6,099,678 should be reversed.**

As an initial matter, in the Response filed September 20, 2004, Appellant questioned how the Examiner could reject claim 5 as anticipated by when its base claim, independent claim 2, has not also been rejected as anticipated by Kotato. Appellant notes that the Examiner has failed to respond to this point, and in the final Action mailed November 24, 2004, has issued the same exact rejection.

With regard to claim 1, in the Action dated June 17, 2004, the Examiner asserted that Kotato teaches the step of temporarily curing the die-bond paste while the semiconductor chip is kept pressurized toward the base portion, citing col. 2, lines 60-67 and col. 3, lines 1-12. The Examiner stated that Kotato, at col. 4, lines 6-19, col. 6, lines 27-6 and col. 7, lines 1-10, teaches the claim feature of finally curing the conductive die bond paste.

In the Response filed September 20, 2004, Appellant submitted that Kotato teaches that the film suction-holding pad 34 is used when a film-shaped die-bonding material 2 is bonded onto a lead frame 7. Appellant submitted that the film suction-holding pad 34 and the compression-bonding element 104 do not correspond to the claimed weight-bearing collet, and do not act together as claimed, and thus the claim feature of "the semi-conductor laser chip is kept pressurized by a collet bearing a weight toward the base portion" is not taught or suggested by Kotato.

Appellant also submitted that Kotato fails to teach or suggest the claim feature of "finally curing the conductive die-bond paste in a thermostat without pressuring by the collet." Specifically, Appellant submitted that Kotato discloses, in the first portion cited to by the Examiner, that the mechanism presses the film-shaped die-bonding material against the support member during final bonding. Appellant submitted that Kato also discloses, in the second and third portions of Kotato cited by the Examiner, that the semiconductor chip is temporarily and finally bonded to the film-shaped die-bonding material on the lead frame using the individual bonding elements 34 and 104. Again, this is not the same as what is claimed. Claim 1 recites finally curing the conductive die-bond paste in a thermostat without pressurizing by the collet, which is not taught or suggested by Kotato.

The Examiner's only response to Appellant's arguments discussed above, other than to simply reiterate his previous rejection, was to state that the Appellant pointed out that Kotato discloses a film suction holding a film shape or a chip bonded to a lead frame or base portion and that Kotato does indeed disclose "a feeder or collect [sic] use [sic] to pressurized [sic] the semiconductor chip toward the based [sic] portion, acting together" (see pg. 5 of the Action dated November 24, 2004).

First, Appellant admitted, in the response filed September 20, 2004, that Kotato discloses a film suction-holding pad 34 (Fig. 7) is used when a film shaped die-bonding material 2 is bonded to a lead frame 7, but did *not* admit that the film suction-holding pad is used when the chip is bonded to a die-pad of the lead frame, as suggested by the Examiner. To clarify, in the device disclosed by Kotato, chip 108 is bonded to the die-pad 106 of the lead frame 108 with chip-bonding device 35 or 104, rather than film suction-holding pad 34, as shown in Figs. 7 and 11. Furthermore, the film-shaped die-bonding material 2 or 101 of Kotato is essentially different from the claimed die-bond paste (element 2 of Fig. 1 of the present application) in both composition and characteristics.

Next, Appellant respectfully submits that Kotato does not disclose a collet used to pressurize the semiconductor chip toward the based portion. Kotato only discloses bonding a fed or punched-out/cut-out film-shaped organic die-bonding material 101 on the support member (die pad) 106 by means of a feeder punching device/cutter and film compression-bonding device, and then heating and compression-bonding a chip 108 on the film-shaped organic die-bonding material 101 on the support member 106 by means of a chip compression-bonding device (as shown in Fig. 11. and described at col. 8, lines 32-49). Kotato does not disclose a collet which keeps the laser chip 3 pressurized toward the base portion 1 during the step of temporarily curing the laser chip, nor does Kotato disclose not pressurizing the laser chip during the final curing step.

In the Action dated November 24, 2004, at the end of item 7, the Examiner stated that Kotato discloses that the element is heated in the traveling table in the final curing step (citing to col. 5, lines 10-20). However, upon reviewing this portion of Kotato, it is evident that this is not

true. Kotato actually discloses that the die bonding material 2, bonded on the lead frame 7, is heated in the traveling table 8 during transportation to the position B (see also Fig. 1), but this does not correspond to the final curing step because the chip is compression-bonded on the bonding material 2 on the lead frame 7 in the next step (see Col. 6, lines 13-18). Furthermore, the traveling table 8 with the heater for curing the die bonding material 2 bonding itself to the lead frame 7 of Kotato does not correspond to the claimed thermostat. A traveling table is not the same as a thermostat.

In sum, Kotato fails to disclose the features of claim 1, namely “heating the semiconductor laser chip mounted on the base portion while the semiconductor laser chip is kept pressurized by a collet bearing a weight toward the base portion, thereby temporarily curing the conductive die-bond paste; and after the temporary curing, finally curing the conductive die-bond paste in a thermostat without pressurizing by the collet.” Accordingly, the rejection of claim 1 should be withdrawn.

The rejection of claim 5 will be discussed in connection with the rejection of claim 2, since claim 5 depends from claim 2.

**B. The rejection of claims 2 and 6 under 35 USC 103(a) as being unpatentable over Kotato in view of Inaba, U.S. Patent 6,255,742 should be reversed.**

Claim 2 recites “A semiconductor laser device comprising a semiconductor laser chip mounted on a base portion by using an electrically conductive die-bond paste including metal filler, wherein thermal resistance of the semiconductor laser device is 90°C/W or lower.”

The Examiner asserted, in the Action dated June 17, 2004, that Kotato discloses the thermal resistance of the semiconductor laser device is 90°C/W or lower and that Inaba shows a semiconductor laser device having a semiconductor laser chip mounted on a base portion using electrically conductive die-bond paste, where the thermal resistance of the semiconductor device is about 30°C/W.



In the response filed on September 20, 2004, Appellant submitted that Tables 1, 5 and 6 of Kotato present experimental results showing a relationship between the number of reflow crack occurrences and the bonding-temperature, load and time, the Ag content of the film, and drying temperature and time of the film. Appellant submitted that Kotato does not disclose the thermal resistance (90°C/W or lower) of the semiconductor laser device as claimed in claim 2.

Although the Examiner rejected claim 2 over the combination of Kotato and Inaba, the Examiner failed to provide any evidence of a motivation to combine or modify the references. Furthermore, it is not even clear how the Examiner intends to combine the references. The Examiner made a statement that Inaba also teaches a semiconductor laser device having a semiconductor laser chip mounted on a base portion using electrically conductive die-bond paste (citing col. 8, lines 62-67), where the thermal resistance of the semiconductor laser device is about 30°C/W, but this is not correct. Inaba does not teach a semiconductor laser device having a semiconductor laser chip mounted on a base portion using electrically conductive die-bond paste. The portion of Inaba cited to by the Examiner merely discloses a heat dispersion plate 7. Inaba makes no mention of mounting a semiconductor laser chip on a base portion using electrically conductive die-bond paste. Furthermore, the Examiner never suggested a proposed combination of the references which would teach the invention of claim 2. Thus, Appellant submits that neither Kotato nor Inaba, either alone or in combination, teaches the features of claim 2.

With regard to claim 6, Appellant previously asserted that neither Kotato nor Inaba teach or suggest, either alone or in combination, the content ratio of silver (82% - 84%) in the conductive die-bond paste as claimed in claim 6. Moreover, while the Examiner asserted that Inaba discloses the amount of die-bond surface of semiconductor laser chip (citing col. 8, lines 62-67), what Inaba discloses here is the formation of the heat dispersion plate, as stated above. Inaba discloses neither the creep-up height as in claim 3 nor the content ratio for the silver in the conductive die-bond paste as in claim 6. Furthermore, even if the resulting combination suggested by the Examiner included all the claim limitations of claims 2 and 6, there is no evidence of the necessary motivation to combine and the Examiner has failed to establish a prima facie case of obviousness. Since the features of claim 2 are not taught or suggested by Kotato, Inaba, or a combination thereof, claim 5 is

allowable at least due to its dependency. Claims 3 and 4 are also allowable at least due to their respective dependencies. Accordingly this rejection should be withdrawn.

### **CONCLUSION**

For the foregoing reasons, Appellant respectfully requests that the rejection of claims 1 and 5 under 35 USC 102(e) as being unpatentable over Kotato, U.S. Patent 6,099,678 and the rejection of claims 2 and 6 under 35 USC 103(a) as being unpatentable over Kotato in view of Inaba, U.S. Patent 6,255,742 be reversed. Claims 1-6 are, therefore, believed to be in condition for allowance.

### **VIII. CLAIMS APPENDIX**

A copy of the claims involved in the present appeal is attached hereto as Appendix A. As indicated above, the claims in Appendix A do include the amendments filed by Applicant on February 5, 2004.

### **IX. EVIDENCE APPENDIX**

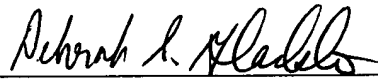
No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

**X. RELATED PROCEEDINGS APPENDIX**

No related proceedings are referenced in II. above, or copies of decisions in related proceedings are not provided, hence no Appendix is included.

Dated: May 23, 2005

Respectfully submitted,

By 

Deborah S. Gladstein

Registration No.: 43,636  
MORRISON & FOERSTER LLP  
2000 Pennsylvania Ave., N.W.  
Washington, DC 20006  
(202) 778-1646

**APPENDIX A****Claims Involved in the Appeal of Application Serial No. 09/987,010**

1. A manufacturing method for a semiconductor laser device in which a semiconductor laser chip is mounted on a base portion by using an electrically conductive die-bond paste including metal filler, the method comprising:

applying the conductive die-bond paste onto the base portion;

mounting the semiconductor laser chip onto the base portion on which the conductive die-bond paste has been applied;

heating the semiconductor laser chip mounted on the base portion while the semiconductor laser chip is kept pressurized by a collet bearing a weight toward the base portion, thereby temporarily curing the conductive die-bond paste; and

after the temporary curing, finally curing the conductive die-bond paste in a thermostat without pressurizing by the collet.

2. A semiconductor laser device comprising a semiconductor laser chip mounted on a base portion by using an electrically conductive die-bond paste including metal filler, wherein thermal resistance of the semiconductor laser device is 90°C/W or lower.

3. The semiconductor laser device according to Claim 2, wherein creep-up height of the conductive die-bond paste at a side face of the semiconductor laser chip from a die-bond surface of the semiconductor laser chip is not more than 40  $\mu\text{m}$ .

4. The semiconductor laser device according to Claim 2, wherein the conductive die-bond paste interposed between a die-bond surface of the semiconductor laser chip and the base portion is 5  $\mu\text{m}$  or lower thick.

5. The semiconductor laser device according to Claim 2, wherein

the metal filler included in the conductive die-bond paste is silver paste.

6. The semiconductor laser device according to claim 5, wherein the content ratio of silver in the conductive die-bond paste is 82% - 84%.